NRC Water Quality Monitoring

Presented by Gary Rosenlieb

Water Resources Division

Meeting of the Networks 2003

Washington, D.C.

FISCAL ROLLOUT

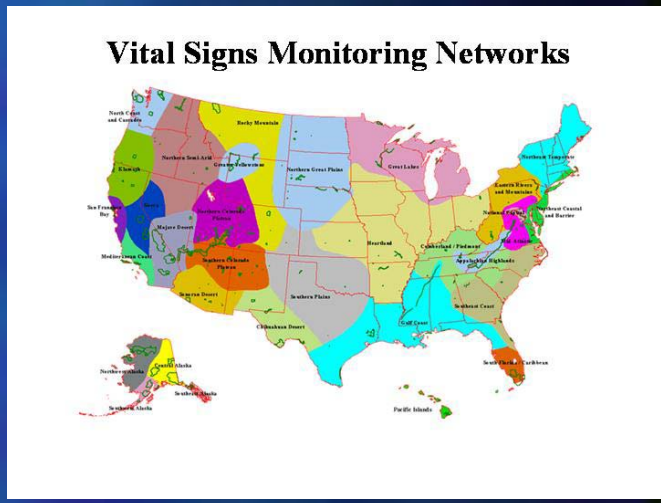
- 2001: $1.275 million
- 2003: $1.775 million
- 2004: $2.372 million
- 2005: $2.9 million

- 32 FTE (= 1 per Network)
- $2.706 million to networks
- $194,000 for data management

Networks Fully Funded in ’01

- Northeast Coastal and Barrier ($90,000)
- Heartland ($82,000)
- Sonoran Desert ($64,000)
- Cumberland/Piedmont ($59,000)
- Central Alaska ($98,000)
- National Capital ($71,000)
- Northern Colorado Plateau ($108,000)
- San Francisco Bay ($70,000)
- Southern Appalachian Highlands ($70,000)
- Greater Yellowstone ($71,000)
- Mediterranean Coast ($76,000)
- North Coast and Cascades ($82,000)

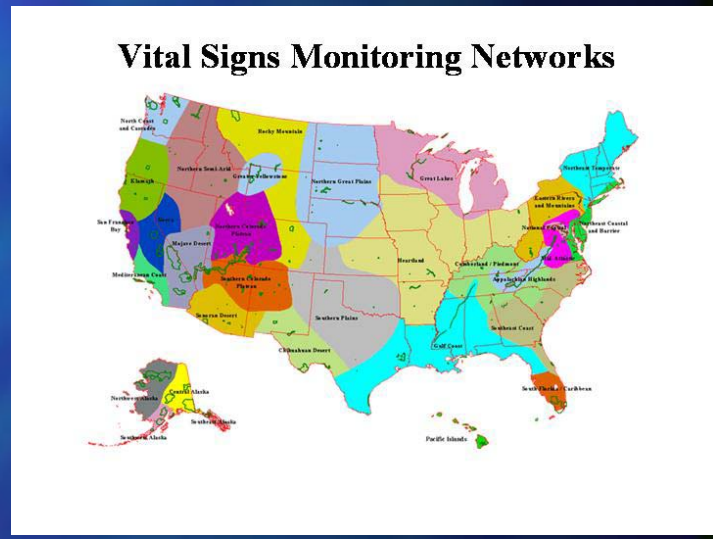
(12 networks: $941,000)



Networks Fully Funded in '03

- Southwest Alaska ($139,000)
- Northeast Temperate ($60,000)
- Southern Colorado Plateau ($124,000)
- Pacific Island ($151,000)
- Great Lakes ($123,000)

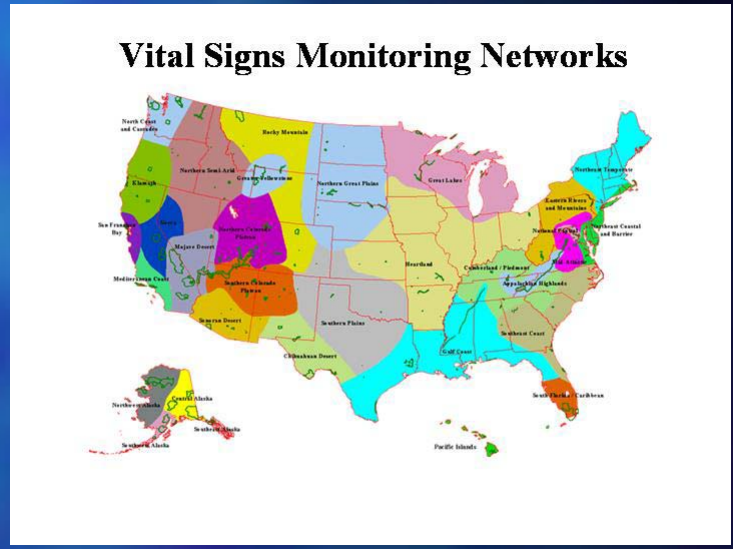
(5 networks $597,000: Total= $1.58 million)



Networks Proposed for Funding in '04

- Gulf Coast ($89,000)
- Rocky Mountain ($61,000)
- Sierra Nevada ($63,000)
- Eastern Rivers and Mountains ($63,000)
- Arctic ($151,000)
- Klamath ($76,000)
- Southeast Coast ($121,000)

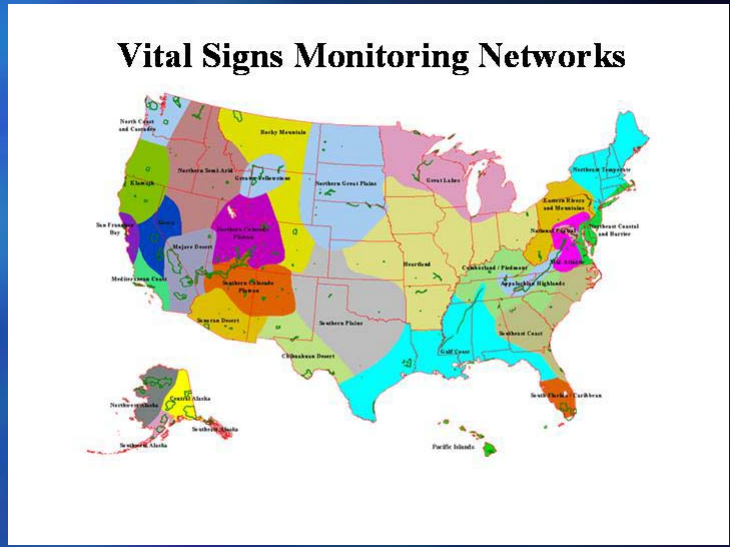
(7 networks, $624,000: Total= $2.204 million)



Networks Proposed for Funding in '05

- Northern Semi-Arid ($50,000)
- Southern Plains ($29,000)
- Mojave ($80,000)
- South Florida/Caribbean ($147,000)
- Southeast Alaska ($42,000)
- Mid-Atlantic ($44,000)
- Chihuahuan Desert ($73,000)
- Northern Great Plains ($81,000)

(8 networks $546,000: Total = $2.706 million)



Design and implementation of water quality monitoring is fully integrated with the Network Vital Signs Monitoring design process

- **Funding**
- **Staffing**
- **Planning**
- **Schedules**
  - **Administrative Reports**
  - **Workplans**
  - **Phase 1, 2, and 3 Vital Signs Plans**
- **Design**
- **Implementation**
- **Data Management**
- **Reporting**

- Note: This is a very "decentralized" design approach

Key Distinction Between NRC-WQ Monitoring and Vital Signs Monitoring

- VS Monitoring: "Know" the Condition (Knowledge)
- WQ Monitoring: "Manage" the Condition (Outcome)
  - Data Needs to be Useful to CWA Regulators

Purpose of NRC-WQ Monitoring

- Track and Support Attainment of NPS and DOI Strategic (GPRA) Goals
  - Protect pristine water quality (e.g., ONRW)
    - **Support additional CWA protections for unimpaired waters**
  - Improve Impaired Water Quality (as defined in GPRA)
    - **Support CWA provisions for improving water quality**

Water Quality Designated Beneficial Use Classifications (I&M Theme #7b)

Servicewide and DOI Strategic Planning Goals:

- **Servicewide Goal 1a4: By September 30, 2005, 85% of 288 Park units have unimpaired water quality.**
- **DOI Draft Outcome Goal: Percent of surface waters that meet EPA approved Water Quality Standards (percent managed, percent influenced)**

Servicewide Vital Signs Long-Term Aquatic Monitoring Guidance

Part A: Identification of priority impaired and pristine waters for the water quality vital signs monitoring component.

Part B: Planning Process Steps. Issues to consider and then to document in a detailed study plan that includes a Quality Assurance Project Plan (QAPP) and monitoring "protocols" (Standard Operating Procedures)

Part C: Draft guidance on WRD required and other field parameter measurements, general monitoring methods, and some design considerations in preparation of a detailed study plan.

Part D: Draft guidance on laboratory analytes/ measurements and their consideration in preparation of a detailed study plan.

Part E: Draft guidance on data reporting and archiving in STORET.

www.nature.nps.gov/im/monitor/handbook.htm

Guidance Overview

- **Relationship of CWA to Network Monitoring**
  - Water Quality Monitoring Component
  - 2 Broad Site Categories* (Drivers)
- **Freshwater, Marine and Estuarine Core Parameters**
  - Water Quality (4 water column measurements)*
  - Water Quantity (Qual./Quantitative flow/level)*
  - Associated Metadata
- **Data Management (WRD Role)**
  - Data entry Templates/Data management protocols*
  - Upload data to STORET
  - Upward Reporting/Servicewide Statistical Summaries*

*Detailed discussion provided in Freshwater and Marine Core Parameters Work Groups White Paper (Aug. 2002, August 2003) and WRD Guidance Documents

http://www.nature.nps.gov/im/monitor/handbk.htm

2 Broad Categories as Monitoring Program Drivers

- **Category 1 Sites** – CWA or Regulatory Driven (State)
  - 303d-listed water body/stream segment ("water quality limited")
    - TMDL is the "fix process"
  - Anti-degradation policy (Protection of Tiers 1, 2, & 3* waters)
    - *ONRW (special status) designation or desired objective (protection)
  - Meet an NPS strategic goal of "measurable or quantifiable" results (GPRA 1a.4) that a regulatory context provides through designated use criteria of narrative and numeric standards (see Part A of WRD Guidance)

- **Category 2 Sites** – Network/Park ID'd Stressors or Threats
  - May not fail an existing designated use narrative or numerical standard but…..
    - Threats or stressors are identified
    - Present or future ecological impairments are possible or likely
    - Need to establish baseline condition (support anti-degradation)
    - Aquatic resource tie-in with other vital sign is apparent (e.g. Air Resource)

Freshwater Core Parameters

- Required Parameters at all monitoring sta.
  - Water Quality (4 – water column field meas.)
    - Temperature (degrees Celsius)
    - Specific Conductivity + Conductivity (uS/cm.)
    - pH Standard pH Units
    - Dissolved Oxygen mg/l
  - Water Quantity (quantitative* or qualitative)
    - Flow or Discharge (flowing water body)
    - Stage/Level (non-flowing water body)
  - Photographic Documentation
    - Minimum record of one digital site photo

Marine, Estuarine Core Parameters

- **Water Quality (Marine & Estuarine)**
  - **Temperature (degrees Celsius)**
  - **Salinity (ppt) + Conductivity (uS/cm)**
  - **pH Standard pH Units**
  - **Dissolved Oxygen (mg/l)**
- **Marine Associated Required Information:**
  - **Tidal stage (e.g. high, low, or mid-tide) and direction (ebb, flood or slack water),**
  - **Estimated Wave Height.**
  - **Flushing time**
  - **Tidal range**
  - **Habitat description**

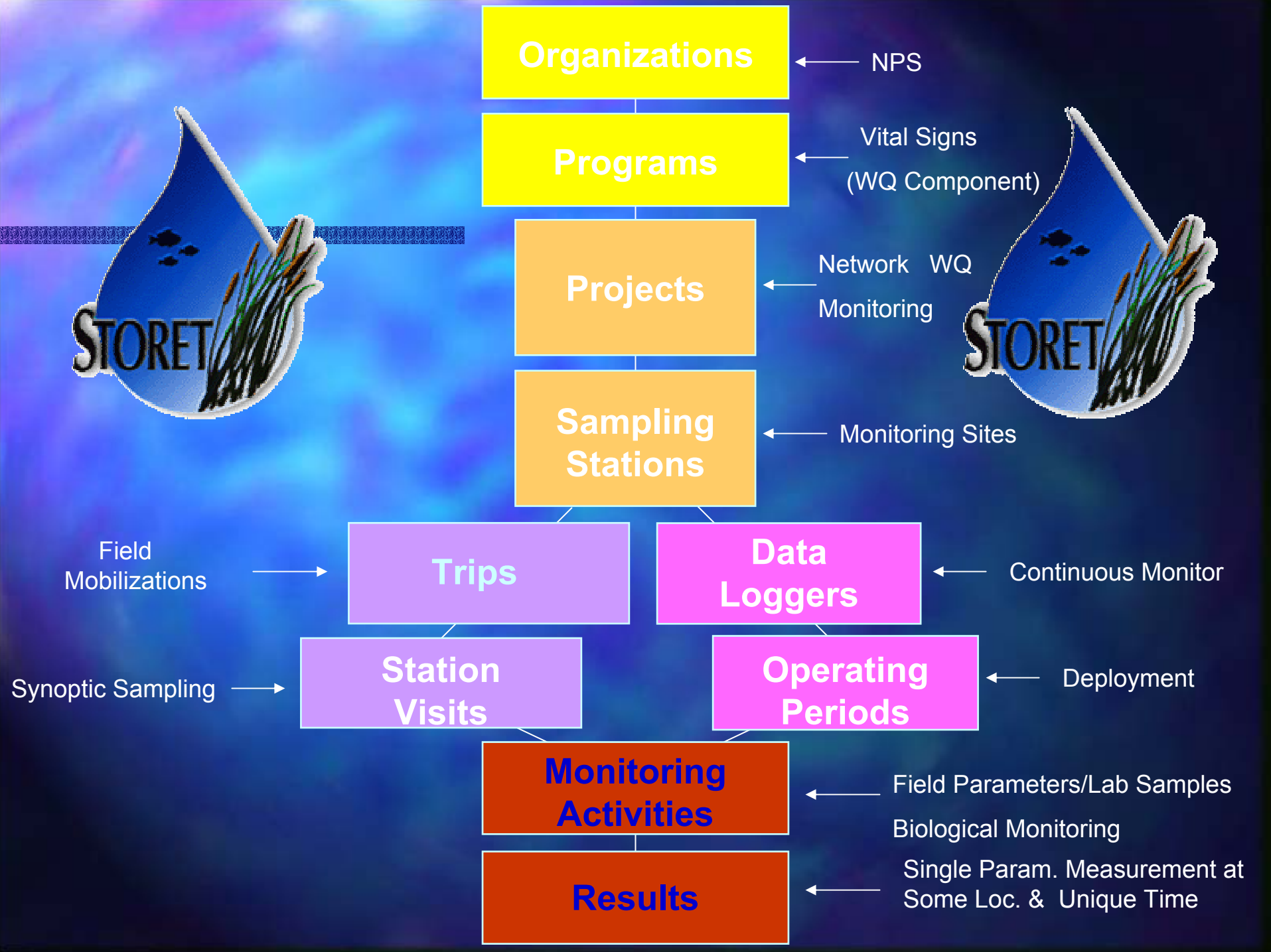
Analytical Laboratories

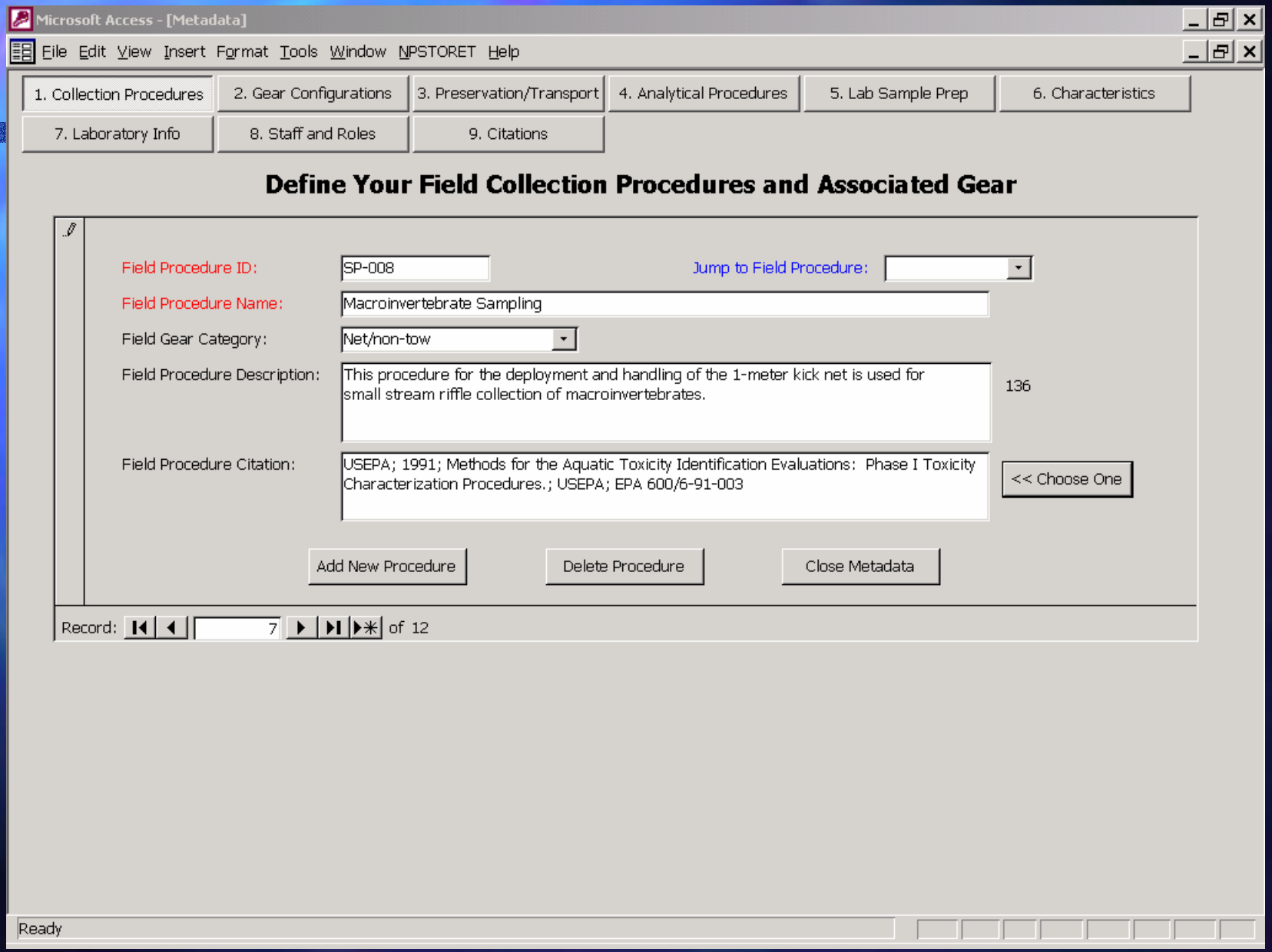
- National Environmental Laboratory Accreditation Program (NELAP)

http://www.epa.gov/ttn/nelac/accreditlabs.html

Data Management (WRD)

- Data Input Templates (STORET)
  - Generated by WRD (Dean Tucker) based on:
    - STORET Requirements
    - NWQMC metadata recommendations
    - Additional NPS metadata input for QA/QC purposes
  - Yearly uploads of Network data (minimum)


Organizations
NPS
Programs
Vital Signs
(WQ Component)
Projects
Network WQ
Monitoring
Sampling
Stations
Monitoring Sites
Field
Mobilizations
Trips
Data
Loggers
Continuous Monitor
Synoptic Sampling
Station
Visits
Operating
Periods
Deployment
Monitoring
Activities
Field Parameters/Lab Samples
Biological Monitoring
Results
Single Param. Measurement at
Some Loc. & Unique Time


Microsoft Access - [Metadata]
File Edit View Insert Format Tools Window NPSTORET Help
1. Collection Procedures
2. Gear Configurations
3. Preservation/Transport
4. Analytical Procedures
5. Lab Sample Prep
6. Characteristics
7. Laboratory Info
8. Staff and Roles
9. Citations
Define Your Field Collection Procedures and Associated Gear
Field Procedure ID:
SP-008
Jump to Field Procedure:
Field Procedure Name:
Macroinvertebrate Sampling
Field Gear Category:
Net/non-tow
Field Procedure Description:
This procedure for the deployment and handling of the 1-meter kick net is used for small stream riffle collection of macroinvertebrates.
136
Field Procedure Citation:
USEPA; 1991; Methods for the Aquatic Toxicity Identification Evaluations: Phase I Toxicity Characterization Procedures.; USEPA; EPA 600/6-91-003
<< Choose One
Add New Procedure
Delete Procedure
Close Metadata
Record: 7 of 12
Ready

What Should be in Final Detailed Water Quality Monitoring Plan? (Vital Signs Phase 3 Final Plan)

General Plan

- List and Map of Network water bodies & sites to be monitored and their significance
- What is the purpose(s) or data objectives for monitoring at each site and some description of how the data is envisioned to be used by the Network and individual Park management?
  - examples:
    - **a. CWA 303-d listing (removal)/(placement)**
    - **b. ONRW listing or possible future listing desired**
    - **c. establish baseline condition where existing or future WQ threat is anticipated**
    - **d. support an anti-degradation policy**
    - **e. long-term trend analysis**
    - **f. address a Park management issue**
    - **g. other (list/indicate)**

What Should be in Final Detailed Water Quality Monitoring Plan? (Vital Signs Phase 3 Final Plan)

General Plan

- Parameters (Including flow/discharge/water level and any biological monitoring) to be monitored by site and frequency of sampling for each suite of parameters that will be monitored
- Summary/synopsis of historical WQ information that was obtained in order to develop monitoring plan. (Can reference prior work in Phase 1 and 2 plans)

What Should be in Final Detailed Water Quality Monitoring Plan? (Vital Signs Phase 3 Final Plan)

Quality Assurance Project Plan

Who will be conducting the monitoring on a site-specific basis

Protocols and SOPs: e.g NAWQA/USGS, EPA State. Specify if changed or varied from site to site or state to state. Provide clear references to the protocol document's) and demonstrate that the particular protocol is applicable in whatever context planned, especially as related to regulatory issues.

What Should be in Final Detailed Water Quality Monitoring Plan? (Vital Signs Phase 3 Final Plan)

Quality Assurance Project Plan

- **Field QA/QC**
  - standards and reference solutions used
  - repeatability tests to be performed,
  - instrument calibration frequencies with documentation
  - % of total lab samples to be field duplicates/replicates,
- **Lab QA/QC** is to be performed
  - statistical assessments/documentation of
  - measurement uncertainty (precision and bias in measurements)
- **Field forms** and **Data Management and Archiving** Procedures and Schedule.

Where to Start?

- Within their detailed study plans each Vital Sign Networks should identify and discuss the waters that are now have protective ONRW or similar protective designations as well as waters that may be candidates for designation. Monitoring plans should be adopted that will achieve the following two objectives:
  - Allow characterization of existing water quality and to identify changes or trends in water quality over time.
  - Identification of specific existing or emerging water quality problems.

Where to Start?

- Each Vital Sign Network should identify and discuss the status of each water that is quality impaired, and should address how each water will be monitored. Generally, long-term monitoring should be conducted in these waters to achieve the following objectives:
  - Gather information on the pollutants that exceed standards that will assist the park and the state to design specific pollution prevention or remediation programs through Total Maximum Daily Loads.
  - Determine whether the overall program goal of improved water quality is being achieved after the implementation of effective pollution control actions.

General Types of Information Needs

- Compile and Update Horizon Reports from STORET and NWIS Databases
- Review of Current State Water Quality Standards
- Review of 305b assessment reports
- Literature related to water quality (spatial distribution, trends, suitability of existing data to characterize conditions)
- Flow-Discharge Information
- Land Use

Network Approaches to Initial Information and Data Collection, Plan Development

- **Inhouse**
  - **Cumberland Piedmont (Joe Meiman)**
  - **San Francisco Bay (Mary Cooprider)**
  - **National Capital (Marion Norris)**
- **CESU**
  - **Sonoran Desert (Andy Hubbard)**
- **USGS**
  - **Northern Colorado Plateau (Tom O'Dell)**
  - **Southern Colorado Plateau (Lisa Thomas)**

Information/Services Available From WRD

-Water Quality Data Inventory and Analysis Reports

-Level I Baseline Inventories (w/ I&M Program)

-Network based data management templates

-Servicewide database management (STORET)

-Impaired water (303d-list) information

-Review of Network Administrative Reports and Workplans

-Preparation of Report to Congress

-Review of Water Resources-Related Conceptual Models and Phase 1, 2 and 3 Vital Signs Monitoring Plans

WRD Points of Contact

Fiscal Management, Technical Assistance, Administrative Reports and Annual Workplan Review

- Barry Long (970-225-3519)
  - North Coast and Cascades
  - Southern Appalachian Highlands
  - Southwest Alaska
  - Southern Colorado Plateau
  - Gulf Coast (04 Start)
  - Sierra Nevada (04 Start)
  - Eastern Rivers and Mountains (04 Start)
  - Mid-Atlantic (05 Start)
- Gary Rosenlieb (970-225-3528)
  - Northeast Coastal and Barrier
  - Sonoran Desert
  - Cumberland Piedmiont
  - National Capital
  - Arctic (04 Start)
  - Mojave (05 Start)
  - Chihuahuan Desert (05 Start)
  - Southern Plains (05 Start)

WRD Points of Contact

Fiscal Management, Technical Assistance, Administrative Reports and Annual Workplan Review and Data Managment

- **Roy Irwin (970-225-3520)**
  - **Heartland**
  - **San Francisco Bay**
  - **Mediterranean Coast**
  - **Pacific Islands**
  - **Great Lakes**
  - **Southeast Coast (04 Start)**
  - **South Florida Caribbean (05 Start)**
  - **Northern Great Plains (05 Start)**
- **Pete Penoyer (970-225-3535)**
  - **Central Alaska**
  - **Northern Colorado Plateau**
  - **Northeast temperate**
  - **Rocky Mountain (04 Start)**
  - **Klamath (04 Start)**
  - **Northern Semi-Arid (05 Start)**
  - **Southeast Alaska (05 Start)**
- **Bill Jackson (970-225-3503)**
  - **Greater Yellowstone**
- **Dean Tucker (970-225-3516)**
  - **Data Management**